

State of California  
AIR RESOURCES BOARD

EXECUTIVE ORDER D-263  
Relating to Exemptions Under Section 27156  
of the Vehicle Code

RIGHETTI ENTERPRISES  
RE-1 ANEROID SYSTEM

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the RE-1 Aneroid System manufactured by Righetti Enterprises, 1627 E. Channel Street, Stockton, California, 95205, has been found not to reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1974 and older model-year Cummins turbocharged heavy-duty diesel engines equipped with a PTG fuel pump.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those submitted by the vehicle manufacturer.

Changes made to the design or operating conditions of the device, as exempted by the Air Resources Board, that adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

No claim of any kind, such as "Approved by Air Resources Board" may be made with respect to the action taken herein in any advertising or other oral or written communication.

Marketing of this device using an identification other than that shown in this Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

**THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF RIGHETTI ENTERPRISES' RE-1 ANEROID SYSTEM.**


Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

Section 43644 of the Health and Safety Code provides as follows:

"43644. (a) No person shall install, sell, offer for sale, or advertise, or except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executed at El Monte, California, this 22<sup>nd</sup> day of July, 1992.

  
R. B. Summerfield  
Assistant Division Chief  
Mobile Source Division

State of California  
AIR RESOURCES BOARD

EVALUATION OF RIGHETTI ENTERPRISES'S RE-1 ANEROID SYSTEM  
FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE  
SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF  
THE CALIFORNIA CODE OF REGULATIONS

July 1992

State of California  
AIR RESOURCES BOARD

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by

Mobile Source Division  
State of California  
Air Resources Board  
9528 Telstar Avenue  
El Monte, CA 91731-2990

(This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.)

# SUMMARY

Righetti Enterprises, of 1627 East Channel Street, Stockton, California, 95205 has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) for their RE-1 Aneroid System. The RE-1 Aneroid System is designed for installation on all 1974 and older model-year heavy-duty turbocharged Cummins diesel engines equipped with a PTG fuel pump.

Righetti Enterprises has submitted a complete application and all the required information including a video tape demonstrating the device and the "snap-idle" test results. Based on an engineering evaluation of the test data and application materials, it was determined that the RE-1 Aneroid System does not have any significant adverse effects on emissions.

The staff recommends that Righetti Enterprises be granted exemption as requested and that Executive Order D-263 be issued for the RE-1 Aneroid System.

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I. INTRODUCTION

Righetti Enterprises, of 1627 East Channel Street, Stockton, California, 95205 has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) for their RE-1 Aneroid System. The RE-1 Aneroid System is designed for installation on all 1974 and older model-year heavy-duty turbocharged Cummins diesel engines equipped with a PTG fuel pump.

Righetti Enterprises has submitted a complete application and all the required information including a video tape demonstrating the device and the "snap-idle" test.

II. CONCLUSIONS

Based on an engineering evaluation of the operating principles and "snap-idle" test data of the Righetti Enterprises RE-1 Aneroid System, the staff concludes that the installation of the Righetti Enterprises RE-1 Aneroid System will not adversely affect exhaust emissions from vehicles for which an exemption is requested.

III. RECOMMENDATION

The staff recommends that Righetti Enterprises be granted exemption as requested and that Executive Order D-263 be issued for the RE-1 Aneroid System.

#### IV. DEVICE DESCRIPTION

The RE-1 Aneroid System decreases fuel flow to the engine during low intake manifold air pressure conditions such as rapid throttle opening. The device may be installed on any 1974 and older model-year Cummins turbocharged engine equipped with PTG fuel pump not already equipped with an Air Fuel Control (AFC) or aneroid system. The RE-1 is similar to the Cummins optional aneroid which is no longer available. The RE-1 is a 6061 T6 billet aluminum valve body with two drilled passages (see drawings in Appendix B).

Four hose connections are provided with the device. The fuel bypass is plumbed from the pressure side of the existing fuel pump to the inlet of the aneroid fuel bypass passage. The aneroid fuel bypass passage outlet is connected to the existing pump suction fitting on the fuel pump. The aneroid leak-off line connects the plunger passage with the existing fuel tank return lines. The air signal line connects the aneroid cover with the intake manifold.

Upon initiation of rapid acceleration, the turbocharger cannot increase the intake manifold pressure to supply sufficient air for the proper air/fuel mixture. The resulting rich mixture causes emission of thick smoke.

During periods of low manifold pressures, such as during rapid acceleration, the aneroid reduces the fuel charge to each cylinder by lowering the fuel rail pressure. As the turbocharger increases the intake manifold pressure, the fuel pressure increases to rated pump calibration volume and pressure. According to the manufacturer, the system, if properly adjusted, reduces the smoke opacity while not affecting performance.



# RE-1 ANEROID SYSTEM EVALUATION AND DISCUSSION

A snap-idle test procedure was conducted to evaluate the emissions impact of the RE-1 Aneroid System. The emissions regulation for applicable vehicles is not to emit smoke with an opacity greater than 55 percent.

Snap-idle testing was performed in accordance with California Code of Regulations (CCR) section 2182 et sq. by ARB North Heavy-Duty Diesel Section on a 1972 model-year Cummins 855 CID heavy-duty diesel engine, model number NTC 350. Two tests were run back-to-back; the first with the aneroid disabled, the second with the aneroid enabled and adjusted to optimum level.

Results are as follows:

## With Aneroid Disabled

<u>Run Number</u>	<u>Percent Opacity</u>
1	100
2	100
3	100
4	100
5	100
6	100

## With Aneroid Enabled

<u>Run Number</u>	<u>Percent Opacity</u>
1	40
2	40
3	43
4	44
5	45
6	45
7	53

The test results show the aneroid system's ability to control the smoke opacity within the prescribed level. With the aneroid disabled, the engine emitted 100 percent opacity smoke. The aneroid was enabled and adjusted to reduce smoke opacity without a significant loss of throttle response. The test results and the video tape of the test demonstrate the aneroid's ability to meet emission standards and, therefore, the aneroid will not have a negative impact on the vehicle's emissions.

**APPENDIX**

**APPENDIX A:**

Installation (ref drawing SROO):

Remove the 1/8" pipe plug located on the bottom of the PTG pump and install a 1/8" / #6 - 90 deg. fitting (ref 22)

If the main pump suction fitting is not outfitted with a 1/8" pipe tap, remove and modify the fitting accordingly, or replace with such a suction fitting. Note: removal of the pulsation damper assembly may be required in order to remove the suction fitting. If so, reinstall the damper assembly after replacing the suction fitting.

Mount the Aneroid assembly to the block via the Aneroid mounting bracket and hardware.

Plumb the air manifold signal line (#4 aeroquip line) as indicated.

Plumb the aneroid leak-off line (#4 aeroquip line) to the fuel tank return line fitting as indicated.

Plumb the #6 aeroquip fuel supply and return lines as indicated.

Reconnect the fuel supply to the PTG pump. Check to make sure all connections are tight, free from binding, or chafing on adjoining components.

#### Adjusting:

Start the engine and allow to warm up. (Disassembly of the fuel plumbing will have undoubtedly allowed some air into the fuel system. This may make starting difficult during the first try). At an idle the air manifold has no boost pressure, the aneroid system will be bypassing some fuel from the pump pressure cavity back to the fuel pump suction line. This will result in a slightly lower idle speed which can be compensated for by making an adjustment to the fuel pump idle circuit. To do this, shut the engine off, and remove the 1/8" pipe plug at the back of the idle plunger / shim pack housing. Insert a small (1/8") straight blade screw driver and gently locate it in the idle adjust slot (approximately 1" inside the housing). Turning the adjustment clockwise will increase idle speed. Advancing the adjustment approximately 1/4 turn should provide noticeable idle speed changes.

Next, "snap test" the engine. If the engine acceleration rate is sluggish, screw the preset adjustment in (clockwise). Continue this process until the engine response becomes satisfactory. If the adjustment is turned in too far, the engine response will continue to improve, but exhaust smoke will increase. The correct setting will provide for adequate throttle response, yet without objectionable exhaust smoke during engine acceleration.

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Righetti Enterprises 1627 E channel St. Stockton, Ca. 95205  
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this document is strictly forbidden without the expressed  
written consent of Righetti Enterprises. Patent Applied.

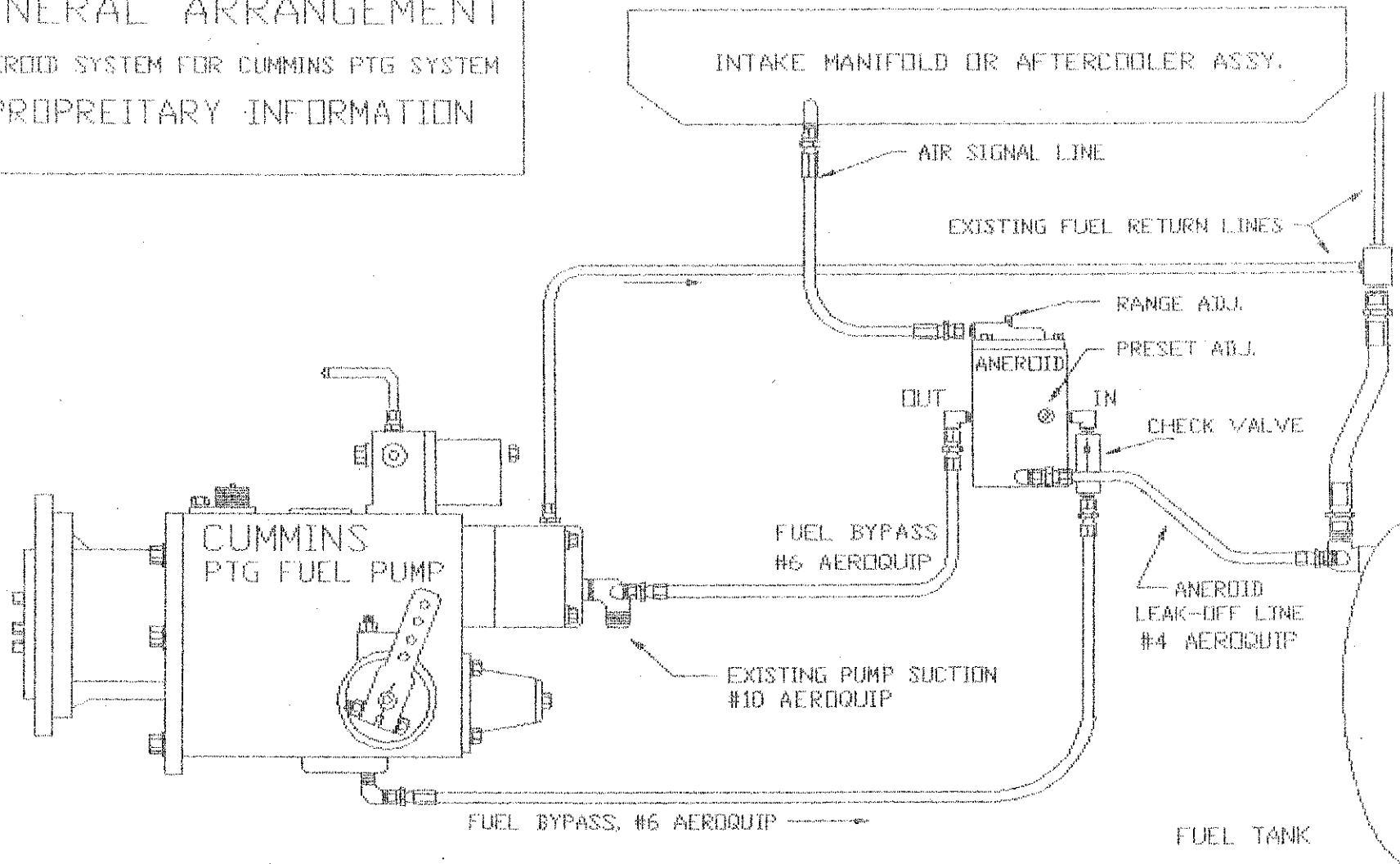
**APPENDIX B:**

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# GENERAL ARRANGEMENT

ANEROID SYSTEM FOR CUMMINS PTG SYSTEM

PROPREITARY INFORMATION

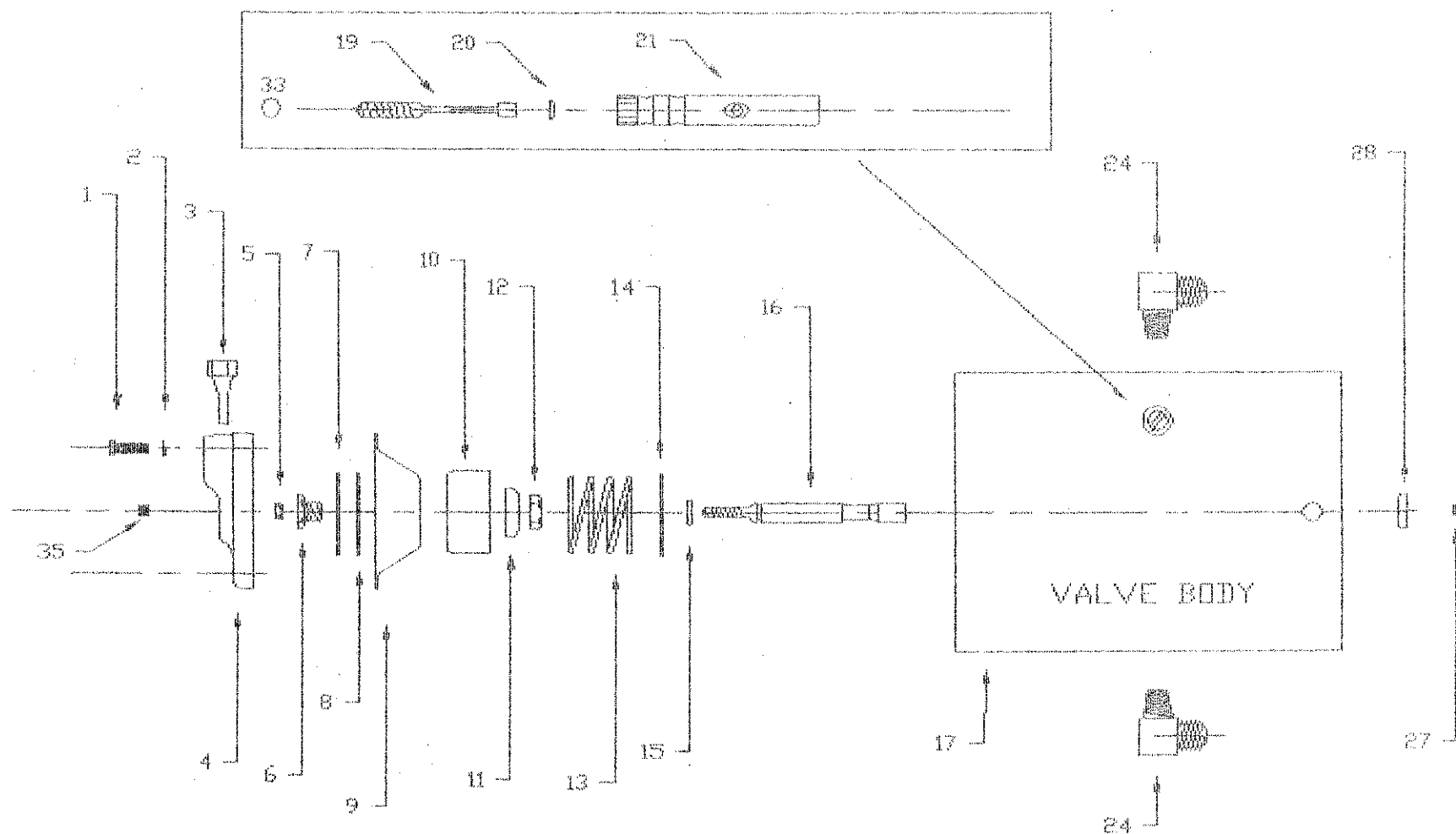


DRAWING NO. PTG3

RIGHETTI ENTERPRISES 1627 E CHANNEL ST STOCKTON, CA. 95205 (209) 464-8306	DATE	REV.	DESCRIPTION
	12/25/90		NEW DRAWING WITH MODULATING SYSTEM, BOOST ACTUATED
	1/20/91	A	RELOCATE LEAKOFF LINE & ADD CHECK VALVE



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# CONTROL VALVE - PARTS ASSEMBLY

DRAWING NO. SR4

RIGHETTI ENTERPRISES  
 1627 E CHANNEL ST  
 STOCKTON, CA. 95205  
 (209) 464-8306

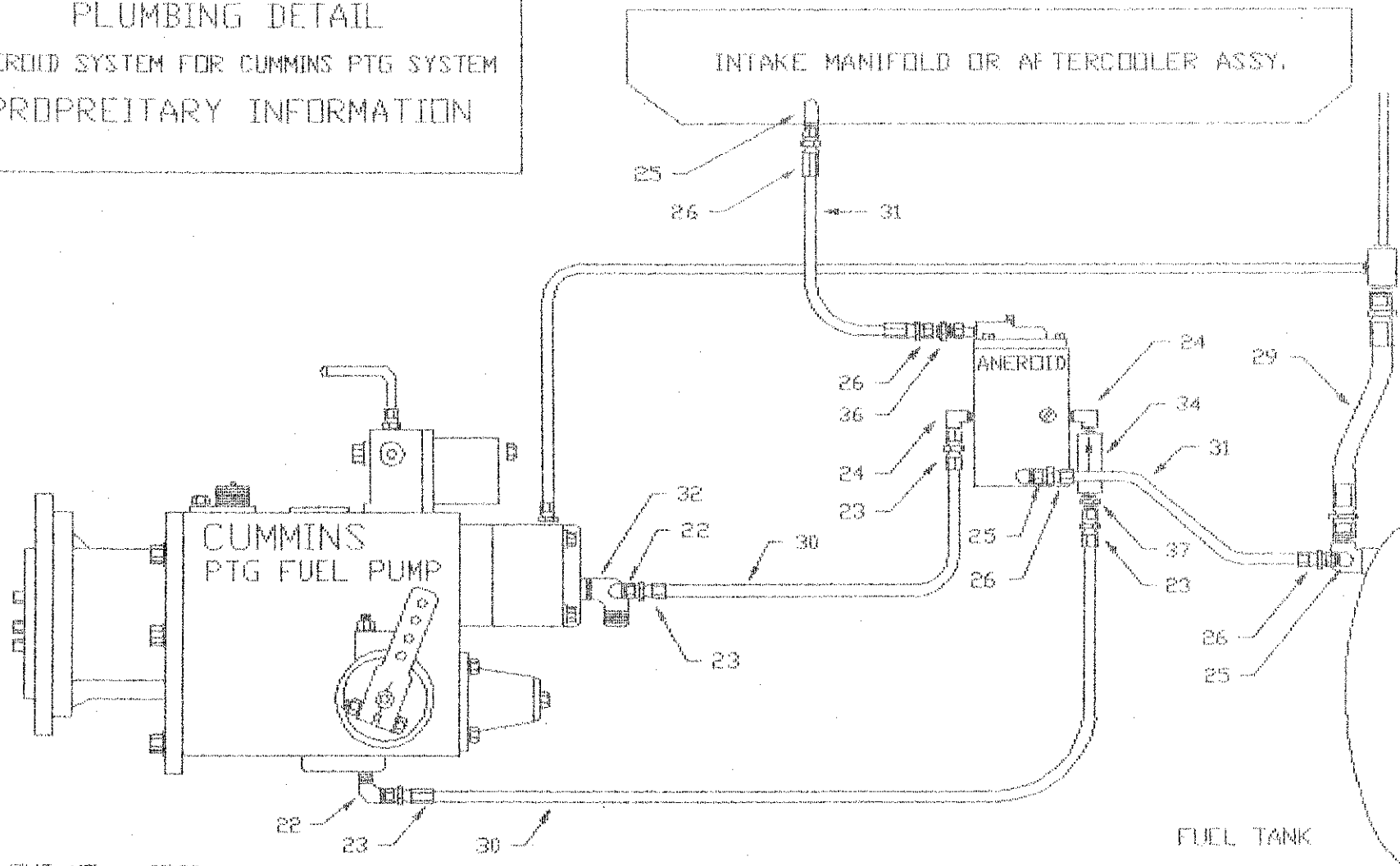
DATE	REV.	
1/1/91		NEW DRAWING
1/21/91	A	ADDED CHECK VALVE AND ORING

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# PLUMBING DETAIL

ANEROID SYSTEM FOR CUMMINS PTG SYSTEM

PROPREITARY INFORMATION



DRAWING NO. SR00

RIGHETTI ENTERPRISES 1627 E CHANNEL ST STOCKTON, CA. 95205 (209) 464-8306	DATE	REV.	DESCRIPTION
	12/25/90		NEW DRAWING WITH MODULATING SYSTEM, BOOST ACTUATED
	1/20/91	A	RELOCATE LEAKOFF LINE & ADD CHECK VALVE

MASTER PARTS LISTING - RIGHETTI ENTERPRISES ANEROID A

REF	PART NO.	DESCRIPTION
1		1/4" SAE X 1.25" LONG CAPSCREW
2		1/4" LOCKWASHER
3	3015522	CHECK VALVE ASSY
4	3015520	COVER
5	5251	JAM NUT
6	3023171	CENTER BOLT
7	3023870	RETAINER
8	214150	WASHER
9	30138115	DIAPHRAM, SILICONE
10	3013810	PISTON
11	3023088	PISTON RETAINER
12	5213A	NUT
13	179834	SPRING (RED/PURPLE)
14	3001707	SHIM
15	38061A	ORING
16	3021676/0	ANEROID PLUNGER (.3738) SIZES 0-6 AVAIL IN .0002" INCREMENTS
17		ANEROID HOUSING
18		ANEROID BARREL
19		PRESET ADJUST SCREW
20		PRESET ORING
21		PRESET BARREL
22	49 X 6 X 2	1/8" TO #6 90 DEG FITTING
23	725-6-68	#6 SWIVEL FITTING
24	49 X 6	1/4" X #6 90 DEG ELBOW
25	49 X 4	1/8" TO #4 90 DEG ELBOW
26	725 X 4 X 45	#4 SWIVEL
27		1/8" MPT PIPE PLUG
28		3/8" CUP PLUG, SHALLOW
29		EXISTING #8 FUEL DRAIN
30		#6 STRATOFLEX LINE
31		#4 STRATOFLEX LINE
32		EXISTING #10 SUCTION FITTING
33		SEAL BALL
34		CHECK VALVE ASSY
35		1/16" IPS PIPE PLUG
36		1/8" IPS X #4 FITTING
37		1/4" X #6 STRAIGHT FITTING